

# **Guidance on Acceptable Means of Measuring or Estimating Water Withdrawals**

## **Bureau of Drinking Water and Groundwater, Wisconsin Department of Natural Resources**

### **May 2012**

The Wisconsin Department of Natural Resource's Water Use program was created to implement the Great Lakes–St. Lawrence River Basin Water Resources Compact and to focus on water quantity challenges statewide. Part of this mission is accomplished through annual **Water Use Reporting**. Wisconsin laws<sup>1</sup> require the annual reporting of water use for certain water withdrawals. Water Use Reporting is required for:

- All high capacity well properties<sup>2</sup>
- All properties with surface water withdrawals permitted under Wis. Stats. Ch. 30.18
- All properties with a Water Use Permit (in the Great Lakes basin)
- Any properties not included in the categories above that withdrew greater than an average of 100,000 gallons per day of surface water or groundwater in any 30-day period

Property owners must measure or estimate the volume of water withdrawn every month and annually report that calendar year's withdrawal information to the DNR by March 1 of the following year. For example, monthly water use reporting for calendar year 2011 water use is due March 1st, 2012. DNR sends reminders regarding the reporting process annually to registered withdrawers.

### **Detailed Requirements for Water Use Measurement or Estimation**

Withdrawals must be measured using the approved measurement methods described below, or persons must have their measurement method approved by the DNR's Water Use Section. Tables 1, 2, and 3 below describe the approved measurement methods, along with the measurement code for water use reporting. Table 1 is for sources with a pumping capacity of 70 gpm or more, Table 2 is for flowing wells or gravity flow withdrawals, and Table 3 is for sources with a capacity of less than 70 gallons per minute (gpm). If you have unusual circumstances that require an alternative method for measuring water use, please contact water use staff to get the method approved at (608) 266-2299 or e-mail at [DNRWaterUseRegistration@wi.gov](mailto:DNRWaterUseRegistration@wi.gov).

If the pump you plan to install has a capacity of 70 gpm or more, either a totalizing flow meter or an hour meter is required. For variable speed pumps and pumps powered by internal combustion engines, a totalizing flow meter is the only approved measurement method. Wells with a pumping capacity of less than 70 gpm may either be metered, or withdrawals may be estimated using the methods describes in Table 3.

A high capacity well approval may specify more stringent monitoring and reporting requirements with which the well owner must comply. These individuals should continue with the monitoring and reporting requirements they have been previously issued. If you have questions concerning reporting, measuring or estimating water use, please see the Water Use Program's frequently asked questions webpage: <http://dnr.wi.gov/topic/waterUse/faq.html>.

Questions can also be directed to the Water Use Program at (608) 266-2299 or [DNRWaterUseRegistration@wi.gov](mailto:DNRWaterUseRegistration@wi.gov)

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<sup>1</sup> Wis. Stat. §281.34 requires that all high capacity well owners annually report the pumpage from their high capacity wells; and Wis. Stat. §281.346 requires that all persons withdrawing water at a rate averaging 100,000 gallons per day or more in any 30-day period, or any person diverting any amount of water from the Great Lakes basin, must annually report their monthly levels of withdrawal.

<sup>2</sup> A high capacity well is any well on a high capacity property. A high capacity property is one property that has a total of 70 gallons per minute (gpm) or more total pumping capacity of all wells. Therefore, a farm that has a large irrigation well and a small residential well on the same property would have two high capacity wells, both the irrigation well and residential well. The flow rate for naturally flowing wells is also included in the total capacity for the property.

<p align="center"><b>Table 1</b></p> <p align="center"><b>Pumping Wells with a Capacity of 70 or More Gallons per Minute</b></p>		
<b>Pump Type</b>	<b>Description of Approved Measurement Method</b>	<b>Measurement Code</b>
Constant Rate Pumps – Electric Powered	<u>Totalizing Flow Meter</u> . Record the water use on the first or last day of each month and calculate the gallons that were pumped between meter readings. See notes 1 and 2, below.	TFM
	<u>Pump Fitted with an Hour Meter</u> . This method may be used only if the actual pumping rate is known within a tolerance of plus or minus 10 percent and the pump is equipped with an hour meter. Record the hour meter readings on the first or last day of each month. Calculate the number of hours that the pump operates each month and multiply that by the number of gallons pumped per hour. Constant rate pumps do not pump at a constant rate when the pressure of the water system varies, therefore, when measuring the actual water use rate with a device that measures the flow velocity through a pipe (ultrasonic meters, etc.), the person performing the measurement must measure the rate under all anticipated conditions and calculate an average. Examples include a pressure tank and switch with a wide pressure range (e.g. 40 to 60 psig), a center pivot irrigation system that includes additional nozzles that cover corners when those nozzles are only operated during part of the cycle, etc. See note 3 below.	THM
Variable Speed Pumps or Internal Combustion Engines Pumps	<u>Totalizing Flow Meter</u> . Totalizing flow meters are the only option. Record the water use on the first or last day of each month and calculate the gallons that were pumped between meter readings. See notes 1 and 2, below.	TFM
Other Department Approved Method	An alternative method that has been approved by the Water Use Section of the WDNR. All alternative methods must be reviewed and approved by the department prior to using. Please contact the Water Use Program at (608) 266-2299 to discuss other measurement methods.	OTH
<p>Notes:</p> <ol style="list-style-type: none"> <li>Flow meters shall be installed, operated, maintained and repaired in accordance with manufacturer's standards, instructions, or recommendations, and shall ensure an error of not greater than plus or minus 10 percent. This includes following the manufacturer's specification for upstream and downstream unobstructed straight piping lengths. Owners, pump installers, and plumbers should use the criteria in this guidance to select an appropriate metering method and meter. Flow meters that are installed outside should be protected from frost and a means to drain the meter.</li> <li>At a minimum, flow meters should be tested for accuracy every four years for meters with a pipe larger than one inch, every ten years for meters that are one inch or less, unless Chapter PSC 185, Wis. Adm. Code specifies more frequent testing.</li> <li>When an hour meter is used to calculate water use, determine actual pumping rate every four years to account for pump impeller wear. The hour meter should be dedicated to pump operation and should not record times when other equipment is operated, such as center pivot rotation without pumping. A licensed pump installer or licensed well driller should determine the actual pumping rate with an approved method of measurement to an accuracy of plus or minus 10 percent. A person who holds an applicable credential under Chapters 443 or 470, Wis. Stats. May also determine the actual pumping rate. Approved methods of measurement include the following: <ul style="list-style-type: none"> <li>Ultrasonic flow meter, temporarily installed.</li> <li>Orifice plate meter or <i>venturi</i> meter, permanently installed.</li> <li>Other flow or velocity measurement methods may be approved on an individual basis. Submit the specifications and proposed procedures for the alternative method to seek approval before use.</li> </ul> </li> <li>To contact the Water Use Program for assistance, call (608) 266-2299 or e-mail at <a href="mailto:DNRWaterUseRegistration@wi.gov">DNRWaterUseRegistration@wi.gov</a></li> </ol>		

<p align="center"><b>Table 2</b></p> <p align="center"><b>Flowing Wells and Gravity Flow Withdrawals</b></p>		
<b>Measurement Method</b>	<b>Description of Approved Measurement Method</b>	<b>Measurement Code</b>
V Notched Weir	A weir is a structure that is used in an open channel to measure the flow rate of water. The flow rate is based on the water depth at a designated location upstream of the weir. For sources with little or no flow rate variability, flow rates must be measured on a daily basis for the first week and weekly thereafter. For sources with flow rate variability, flow rate must be measured daily.	MVW
Rectangular Weir		MRW
Horizontal Pipe	Flow Rate is measured by discharge from a horizontal pipe on a daily basis for the first week and weekly thereafter.	MHP
Estimate from a specific irrigation or flooding event	You may estimate your withdrawal by calculating the amount of water withdrawn for a specific irrigation or flooding event. For example, you can estimate the amount of water withdrawn for a flooding event if you know the number of acres flooded and the depth of the flood.	COTH
Other Department Approved Method	An alternative method that has been approved by the Water Use Section of the WDNR. All alternative methods must be reviewed and approved by the department prior to using. Please contact the Water Use Program at (608) 266-2299 to discuss other measurement methods.	OTH

**Table 3**  
**Measurement For Sources That Are Pumped or Flow at a Rate Less Than 70 Gallons per Minute**

Measurement Method	Description of Approved Measurement Method	Measurement Code
Estimate Water use for Residential Use (Homes, Condominium Homes, Apartments, Trailer Homes, etc.)	<u>This method may only be used if the water is used solely for domestic purposes in a residence.</u> Assume 2,000 gallons of water per resident per month, thus multiply the average number of residents served by the well during each month by 2,000 to estimate the number of gallons that were pumped during each month. Wells that serve a condominium clubhouse, swimming pool at a condominium or apartment complex, etc., should have a water meter installed.	LER
Estimate Water use for Dairy and Animal Husbandry Where a Flow Meter is Not Installed.	For farms with cattle or poultry, well(s) used to supply water for the animals and related uses (including milk processing, equipment cleaning, etc.) can be estimated at the following gallons per animal per month: Dairy cattle, 1,800. Beef cattle, 750. Horses, 350. Hogs, Ostriches and Emus, 100. Sheep, Goats, Llamas, Alpacas, 60. Turkeys, 6. Chickens, 3. If more than one well is in use, divide the total estimated water usage by the number of wells and report that result for each well.	LED
Estimate for both Animal Husbandry and Residential Use	Estimate for both animal husbandry and residential use based on the number of persons (2,000 gallons per person per month) and animals (see list above for animal types) served.	LERD
Estimate or Measure Water use for Wells Used for Agriculture, Other Than for Animals and Not for Irrigation	If the well is for limited use with a pumping capacity of 20 gpm or less, such as minor cleaning purposes along with restrooms in a barn or shop, use an estimate of 20 gallons per person per day. If the well is used for irrigation, food processing or washing agricultural products, a meter or hour meter is necessary.	LEO
Estimate Water use for Campgrounds	Estimate 10 gallons per day per person if no showers or laundry machines are provided; otherwise assume 35 gallons per day per person at the campground that day.	LEC
Estimate Water use for Hand and Wind Powered Pumps	For hand operated pumps, assume 1,000 gallons per month during months when the well is used. For wind powered pumps, contact the department, see note 3 below.	LEP
Estimate for sources used for Domestic and Sanitary Purposes	Estimate for office settings or other settings where water is solely used for domestic and sanitary purposes (20 gallons per person per day).	LEW
Estimate Based by Rate of Flow	Estimate based on rate of flow (timed to fill a container of known volume, such as a five gallon bucket or small barrel) and maintain records of hours/minutes used.	LET
Estimate for flowing wells at a rate less than 70 gpm	Estimate for flowing wells based on flow over a weir, flume or vertical pipe as described in Appendix 16 of Groundwater and Wells, 1986.	LEF
Measurement Options for All Situations Including Situations Not Listed Above.	<ul style="list-style-type: none"> <li>Water use can be measured with a totalizing flow meter. Record the meter reading on the first or last day of each month, the difference between monthly readings is the amount of water pumped that month. For wells that are not regulated by Chapter PSC 185, Wis. Adm. Code, meters should be tested and calibrated for accuracy every ten years for accuracy for meters with a pipe size of one inch or less, and every four years for larger meters. Chapter PSC 185, Wis. Adm. Code specifies more frequent testing and calibration for well systems that are regulated by the Public Service Commission.</li> <li>If a variable speed pump is <i>not</i> used, water use can be estimated based on the pump rating in gallons per minute and an hour meter that measures cumulative hours of pump operation. Record the hour meter reading on the first or last day of each month. To estimate the water use for each month, calculate the number of hours the pump operated that month, multiply that by the pump capacity in gallons per minute and multiply that by 60 to estimate the gallons pumped during that month. If a variable speed pump is used, only a totalizing flow meter may be used. The hour meter should only measure hours of pump operation.</li> </ul>	
Notes: 1. For water uses that are not specifically listed above, such as irrigation, food processing, washing of agricultural products, motels, restaurants, golf course clubhouses, offices, taverns, etc., use a meter as described above in the category of "measurement options for all situations." 2. Meters shall be installed, operated, maintained and repaired in accordance with manufacturer's standards, instructions, or recommendations, and shall ensure an error of less than 10 percent. Most meter manufacturers specify a minimum length of unobstructed straight piping, both upstream and downstream of the meter for accurate readings. Owners, pump installers and plumbers should use the criteria in this guidance to select an appropriate metering method and meter. 3. To contact Water Use staff for assistance in developing a site specific estimate based on unusual circumstances, call (608) 266-2299 or e-mail at <a href="mailto:DNRWaterUseRegistration@wi.gov">DNRWaterUseRegistration@wi.gov</a>		

## Frequently Asked Questions

**• If I withdraw from both surface water and groundwater on my property, do I need to report both types of withdrawals?**

Yes. Regardless of the type of water source, you must report your total monthly withdrawals in gallons for all sources on the property. You will be prompted by the water use section to report water use for each of your water sources that have been registered. If the property has a withdrawal of water from a source that you do not have a form for, please contact the Water Use Program at (608) 266-2299.

**• What if my method for measuring is not listed in the instruction handout?**

The Measurement Code column in the tables lists all of the approved measurement methods. Alternative measurement methods for water withdrawals are allowed, but require approval by the WDNR. If you would like to use an alternative method, please contact the Water Use Program at (608)266-2299 or send an email to [DNRWaterUseRegistration@wi.gov](mailto:DNRWaterUseRegistration@wi.gov).

**• I lease my property with the irrigation well to someone else. I have no way of knowing how much water was pumped. Am I exempt from reporting requirements?**

No. The owner is ultimately responsible for reporting. However, the operator of the property has the ability to report online for the sources that they operate, or the operator may contact the DNR Water Use Program to request a copy of the reporting forms. Ideally, the owner and the lessee will work cooperatively to 1) get the necessary metering devices installed; 2) measure or estimate pumpage; and 3) submit the data to the department.

**• I bought the property with the high capacity well mid-year. The previous owner did not give me any meter readings for the first part of the year. What do I do?**

Make the best estimate that you can based on the well usage after you bought the property and any estimates you can make about the usage by the prior owner.

**• If I report more water usage than I actually used, does that mean that I will have more water allocated to me next year?**

No. The department does not allocate water based on prior use. You may use as much water as your high capacity well approval allows. You should report the amount that you actually used.

**• I have not used the well for at least three years. Do I need to fill out the pumpage form?**

According to the well code (Chapter NR 812, Wisconsin Administrative Code), a well that has been taken out of service must be filled and sealed (abandoned in accordance with the well code) by a licensed well driller or pump installer within three years. If you have a reasonable expectation that you will use the well within the next two years, you can request approval to temporarily abandon the well for up to two years. If you have not used the well for more than three years (five years if temporary abandonment was approved) the well must be properly filled and sealed. Once the well is properly filled and sealed and department records are updated, you will not need to fill out water use forms. However you must submit the water use forms until then, and you should report zero water use and make arrangements to fill and seal (abandon) the well.

**• What happens if I refuse to report pumpage?**

Chapter 281 of the Wisconsin Statutes specifies financial penalties for each violation.

**• What if I have a question not listed above?**

If you have a question not listed above contact the Water Use Program at (608) 266-2299, send an email to [DNRWaterUseRegistration@wi.gov](mailto:DNRWaterUseRegistration@wi.gov), or visit our website: <http://dnr.wi.gov/topic/wateruse/>.